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UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for

SOIL CONSERVATION SERVICE RESEARCH**

MARCH 1947

EROSION CONTROL PRACTICES DIVISION

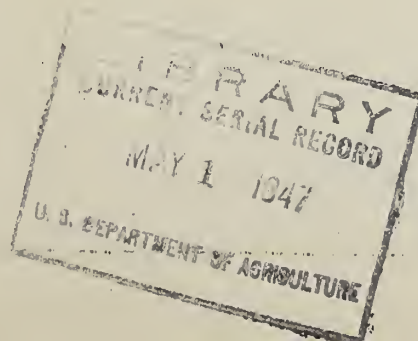
Soybean Yields in Relation to Tillage and Fertilizer Treatments -
R. A. Norton, Ames, Iowa.-"During the year 1946 tillage investigations were carried on at six different locations in Central Iowa. This was in addition to similar tests on two different soil types on the Agricultural Engineering Research Farm at Ames.

"At each test field, at least four different methods of preparing land for corn or soybeans were studied. The conventional method, plowing and surface planting was used as the basis for comparison. Other methods studied at all locations were hard-ground listing, subsurface tillage, and disking. The disking was done with a bush and bog harrow, an exceptionally heavy single-gang disk harrow which was found to be considerably more effective as a tillage tool than the ordinary disk harrow found on most farms.

"Yields of soybeans obtained under the four different tillage treatments combined with four different fertilizer treatments at three different locations are summarized in the table on the following page. While there are no outstanding differences in average yields, I wish to direct your attention to the results obtained by subsurface tillage. There is a sufficiently consistent trend toward high yields by this treatment to assure that the grand average yield was at least as good as that obtained from land prepared in the usual manner by plowing. Superiority on individual fields seemed to occur most often where the 3-12-12 fertilizer was used.

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**All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.



| Farm and Soil Type | Fertilizer Treatment | Tillage Method | | | | |
|--|-------------------------|---------------------------------------|--------------------------|-----------------------|-----------------------|----------------|
| | | Yield, bushels per acre, 12% moisture | | | | |
| | | Plowing | Listing (hard-ground) | Subsurface tillage | Disking (bush&bog) | Ave. of All |
| Fred & Bob Hudson Sharpsburg silt loam | None | 25.5 | 23.0 | 24.7 | 24.6 | 24.4 |
| | 3-12-12 | 26.7 | 24.7 | 26.0 | 24.2 | 25.4 |
| | 20-0-0 | 28.8 | 25.6 | 28.4 | 27.7 | 27.6 |
| | Both | 23.7 | 27.7 | 26.1 | 24.8 | 25.6 |
| | Average | 26.2 | 25.2 | 26.3 | 25.3 | - |
| Robert Miller Mahaska silt loam | None | 26.5 | 25.5 | 26.6 | 27.2 | 26.4 |
| | 3-12-12 | 27.5 | 24.5 | 29.4 | 25.4 | 26.7 |
| | 20-0-0 | 28.6 | 27.2 | 27.8 | 28.9 | 28.1 |
| | Both | 28.2 | 27.3 | 30.4 | 29.5 | 28.8 |
| | Average | 27.7 | 26.1 | 28.6 | 27.8 | - |
| Earl Smith Grundy silt loam | None | 22.6 | 21.5 | 21.8 | 20.2 | 21.5 |
| | 3-12-12 | 21.8 | 23.7 | 23.4 | 20.5 | 22.4 |
| | 20-0-0 | 22.9 | 23.2 | 21.7 | 21.1 | 22.2 |
| | Both | 21.4 | 23.4 | 23.7 | 22.0 | 22.6 |
| | Average | 22.2 | 23.0 | 22.6 | 21.0 | - |
| Average 3 locations | None | 24.9 | 23.3 | 24.4 | 24.0 | 24.1 |
| | 3-12-12 | 25.3 | 24.3 | 26.3 | 23.4 | 24.8 |
| | 20-0-0 | 26.8 | 25.3 | 26.0 | 25.9 | 26.0 |
| | Both | 24.4 | 26.1 | 26.7 | 25.4 | 25.7 |
| | Average | 25.4 | 24.8 | 25.8 | 24.7 | - |

(Preliminary Tabulation Only -- Subject to Correction)

Yields of Different Meadow Mixtures - Richard M. Smith, Morgantown, West Virginia. - "A summary of meadow plot yields recently prepared by Mr. Schaller of the Experiment Station show some interesting differences. The plots were seeded in August 1943. Yields for certain mixtures are as follows:

| Mixture | Yields | |
|-----------------------------|--------|------|
| | 1945 | 1946 |
| R. Clov. - timothy | 4698 | 4011 |
| Alf.-r.clov.-timothy | 6369 | 5997 |
| Alf. - brome | 6480 | 6474 |
| Alf. - timothy | 6113 | 5273 |
| Alf. - orchard | 5592 | 4686 |
| Alf. - meadow fescue | 6554 | 5976 |
| Ladino clover - brome | 5194 | 4575 |
| Ladino clover - timothy | 5230 | 4594 |
| Ladino clover - orchard | 5525 | 4042 |
| Birdsfoot trefoil - brome | 3374 | 3742 |
| Birdsfoot trefoil - timothy | 4153 | 3957 |
| Birdsfoot trefoil - orchard | 4385 | 4324 |

"Although all plots are in triplicate, certain apparent differences are probably due to high plot variability. For example, there is an extraordinary range in the three plots of alfalfa-brome so that the apparently superior yield of this combination is not significantly different from the other alfalfa-grass plots. However, the high yield potential of alfalfa compared to clovers is clearly evident even on this soil which is not a good soil for alfalfa. The yields of birdsfoot trefoil and grass are of special interest because this legume offers promise for hill land meadow and other areas where a long-lived stand is needed. Although the yields of the birdsfoot combinations are relatively low they seem to tend to improve with time whereas all our other meadow legumes are quite short lived. If birdsfoot trefoil meadows will persist indefinitely as hoped, the evidence of yields close to 2 tons per acre appears to offer a great opportunity for improving the return from many hill land meadows. For with no legume the meadows seldom yield more than one ton of poor quality hay per acre."

Vegetal Yields and Runoff from Pasture Plots - C. A. Van Doren,
Dixon Springs, Illinois.-

| | Weeds (1) Pounds/A | Grasses & Legumes(1) Pounds/A | Runoff(2) Inches |
|------------------------------|-----------------------|----------------------------------|---------------------|
| Treated, severely grazed | 1111 | 2507 | 7.3 |
| Treated, moderately grazed | 942 | 3448 | 3.7 |
| Untreated, severely grazed | 2339 | 929 | 7.8 |
| Untreated, moderately grazed | 1919 | 1102 | 8.0 |

(1) Average yields, 6 year period (1940-47)

(2) Average runoff, 8 years (1938-46)

"Over a six year period the amount of weeds produced was considerably greater on the untreated plots and significantly greater on the severely than on the moderately grazed plots. One of the most significant results obtained from the experiment is the reduction in runoff resulting from good treatment and grazing management. Approximately four inches more rainfall was retained on the pastures by good treatment. This savings in moisture has undoubtedly contributed much to the increased production of desirable forage."

Effectiveness of Stubble Mulch and Rotary Subsoiler in Preventing Erosion - Hugh C. McKay, St. Anthony, Idaho.-"A field inspection was made with Mr. H. L. McBirney, District Conservationist, of the field trials in the Idaho Falls work group. Considerable runoff occurred in the area this spring due to the frozen condition of the soil and the rapid melting of the snow.

"We observed some very good demonstrations of the value of stubble mulch and the use of the rotary subsoiler for erosion control.

"On one trial where sweeps were used for fallowing in 1946 there was considerable stubble left on the surface. This spring no erosion occurred on this field while on the adjacent untreated fields severe erosion occurred.

Some runoff occurred on the treated field but the stubble mulch prevented any gullyng. Neighboring farmers stated that this field has the best stand of winter wheat in the valley.

"The use of the rotary subsoiler is becoming quite widespread in this work group. No runoff occurred on fields that were seeded to winter wheat and then gone over with the rotary subsoiler, while adjacent fields were severely eroded. The rotary subsoiler left quite large holes in the fallow fields but did not seem to disturb the stand of wheat too much. One treated field observed was adjacent to and below a steep, grassy slope that has never been plowed. There was considerable runoff from the grassy slope onto this field, severe gullyng occurred for the first few feet in the field, but within 100 feet all traces of erosion had disappeared. The slope on this cultivated field was about 15%; this clearly demonstrated the value of the rotary subsoiler in preventing runoff.

"On stubble fields that were gone over with the rotary subsoiler, the results were not as good as desired. The straight teeth on the Calkins machine did not make very large holes. The holes soon filled and some runoff occurred. It is quite evident that the older type of curved teeth that leaves a larger hole is more desirable to use on stubble ground."

Wind and Water Erosion in Relation to Crop Residue and Tillage Methods - F. L. Duley, Lincoln, Nebraska.-"Some soil blowing took place in this area earlier in the season, and on March 20 heavy winds over much of western Nebraska caused additional severe damage. Many farmers last fall figured on getting one more high-priced wheat crop, burned off much stubble or covered the residue by plowing or heavy one-wayng. This land has suffered severely. Much soil has been lost from fields and the crop has been severely damaged in many places. The extent of such damage cannot be accurately assessed at this time. Some very remarkable differences occurred on our wheat plots this season. On many of the plowed plots the soil became very loose and fluffy, with particles fine enough to blow. Whereas, on the stubble mulch plots the soil stood up with ridges between the rows with sufficient residue and firmness of the soil itself to prevent blowing.

"These plowed plots are also in condition for excessive water erosion, should we have a torrential rain soon. The amounts of runoff and erosion last year were much below average and were the smallest of any year since this project was started. The following table will give the results for 1946. It will be noted that the differences in favor of stubble mulching over plowing are relatively as great as when losses are higher.

Runoff and Erosion - Lincoln, Nebraska, 1946

| Plot | Rotation | Crop 1946 | Tillage | Runoff Inches | Erosion Tons/A |
|--------|------------------------------|--------------|-----------|------------------|-------------------|
| 10 | Corn, oats, wheat-Residue | Wheat | Subtilled | Tr. | Tr. |
| 15 | Corn, oats, wheat-No Residue | Wheat | Plowed | 1.06 | 1.53 |
| 17 | Corn, oats, wheat-Residue | Corn | Subtilled | .04 | .04 |
| 22 | Corn, oats, wheat-No residue | Corn | Plowed | .55 | 1.02 |
| 23 | Corn, oats, wheat-Residue | Corn | Plowed | .59 | .20 |
| 42 | Corn, oats, wheat-Residue | Oats | Subtilled | .04 | .18 |
| 45 | Corn, oats, wheat-No residue | Oats | Plowed | .12 | .44 |
| 41 | Corn, oats, wheat-Residue | Oats | Plowed | .15 | .55 |
| F 24 S | S.Cl., S.Cl., corn-Residue | Corn | Subtilled | Tr. | Tr. |
| F 24 P | " " " " | " | Plowed | .36 | 1.49 |
| F 23 S | " Corn Residue | " | Subtilled | Tr. | Tr. |
| F 23 P | " " Residue | " | Plowed | .04 | .03 |
| | Brome sod - north | Brome | - | Tr. | .00 |
| | Brome sod (Installed 1946) | Brome | - | .13 | .08 |

Soil Organisms as Influenced by Crop Residue and Tillage - "Studies on the effect of crop residue on the surface of the soil on the numbers of soil organisms have been made by Roy C. and Virginia T. Dawson and T. M. McCalla. Their results indicate that residue on the surface greatly increases the number of microorganisms in the surface inch of soil. The following table will show the effect on number of fungi on subtilled vs. plowed land.

Density of fungi in the surface inch of soil in
which residues were subtilled and plowed

| Kind of Residue | Date of Application | Date of Sampling | No. x 10 ⁻³ per gram of soil | | d | d ² |
|--------------------|------------------------|---------------------|--|--------|-----|----------------|
| | | | Subtilled | Plowed | | |
| Wheat straw | July 1944 | 3-28-45 | 208 | 153 | 55 | 3,025 |
| " " | " " | 5-31-45 | 210 | 184 | 26 | 676 |
| " " | " " | 9-11-45 | 139 | 114 | 25 | 625 |
| " " | " 1945 | 3-28-46 | 240 | 121 | 119 | 14,161 |
| " " | " " | 7-22-46 | 266 | 299 | 33 | 1,089 |
| Oat straw | " " | 10-4-45 | 325 | 199 | 126 | 15,876 |
| Sweetclover | Apr. 20, 1945 | 6-13-45 | 207 | 188 | 19 | 361 |
| " " | " " | 8-29-45 | 159 | 104 | 55 | 3,025 |
| " " | June 15, " | 8-25-45 | 289 | 161 | 128 | 16,384 |
| " " | " " | 10-5-45 | 153 | 98 | 55 | 3,025 |
| " " | May 3, 1946 | 5-8-46 | 353 | 199 | 154 | 23,716 |
| " " | " " | 8-7-46 | 224 | 150 | 74 | 5,476 |
| | | | 2773 | 1970 | 803 | 87,439 |

Mean

231.08 164.17 66.91

| Mean dif- ference (d) | Std. error of mean dif. (Ed) | $\frac{\bar{d}}{Ed}$ | t values | |
|--------------------------|---------------------------------|----------------------|----------|-------|
| | | | 5% | 1% |
| 66.91** | 15.979 | 4.187 | 2.201 | 3.106 |

**Significant at the 1% level.

Wind Erosion in New Jersey - O. R. Neal, New Brunswick, New Jersey. - "High winds from March 25 to 30 removed 2 to 3 inches of surface soil from one plot planted to peas leaving the peas exposed. This plot is in a clean cultivated system and had no winter cover crop. An adjoining plot planted to peas where a winter cover of ryegrass and vetch had been plowed under lost no soil during this period of blowing. It appeared that the roots and other plant remains of the cover crop prevented the loss.

"Movement of soil from bare areas by wind is common during the spring period. Even in cases where the quantity of soil moved is not great, severe damage to young plants often occurs. In the sweet corn areas of Burlington County, replanting is often necessary as a result of damage to seedlings by blowing sand. This involves not only the extra cost of seed and labor in replanting, but puts the crop on the market at a later date when prices are often less favorable.

"It has been and continues to be recommended to these growers that a system of strip cropping or field stripping, depending on the topography, be followed. The vegetated strips will prevent soil blowing during the critical spring period. At the same time the strips can be left at a different location from year to year and a system of land resting will be effected. This treatment, in turn, will contribute to increased conservation of soil and water and will increase acre yields."

Smooth Brome Roots Deep Compared with Timothy and other Grasses Tested - R. M. Smith, Morgantown, W. Va. - "Grass root studies completed on one soil type by Mr. Geo. Gist show conclusively that smooth brome is a deeper rooting grass under this condition than bluegrass, timothy, orchard grass, or Deer tongue (wild, and tolerant Panicum). At the 12-18 inch depth, brome grass showed 101 pounds of roots compared to 30 pounds for orchard grass, 16 for Deer tongue, 5 for timothy and 3 for K. bluegrass. In the surface 0-3 inches, the brome had the least roots. The difference among the grasses is brought out by the following ratios of the roots per inch in the surface 3 inches to the roots per inch at 12-18". These are:

| | | | |
|-----------------|-------|---------------|-------|
| Brome - | 7:1 | Deer tongue - | 272:1 |
| Orchard grass - | 42:1 | Bluegrass - | 339:1 |
| Timothy - | 105:1 | | |

"This study by Mr. Gist included a determination of volume weights, pH and soil organic matter. No definite correlations between these properties and root development could be established, partly because of insufficient replication and sampling.

"We have been making some preliminary physical tests of soils which might be useful as indices of important properties in conservation surveys. Wetting rate, aggregate stability, textural permeability, shrinkage, and tensile strength are the tests which have been given some consideration and which appear to offer some promise."

Rye Grass has Good Root System and It is Favored as a Winter Grazing Crop - B. H. Hendrickson, Watkinsville, Georgia. - "Kentucky fescue 31 (Suiters grass) was drilled on a well prepared fertilized seedbed last September. Volunteering ryegrass appeared in a part of the field. With but little competition from the slow-growing seedlings of the perennial fescue grass, each ryegrass plant stooled out to form a massive clump. It is now impossible to pull up most of these ryegrass clumps, using both hands even though the soil is soft and mellow. When one is torn loose, the mass of roots and soil fill a dish pan. Volunteer oat plants in the same area had a much smaller root system."

"Ryegrass is becoming very popular with Georgia cattlemen for winter grazing purposes. On eroded hill land, it is important that winter grazing crops supply a firm sod support for livestock during rainy periods. Ryegrass appears to be the best available grass for this purpose, on account of its dense fibrous root system, rapid growth, palatability and winter hardiness."

Winter Grazing of Beef Cattle - "During the past 5-months 'winter grazing period', November 1 - March 31, supplemental barn feeding of hay and grain has been necessary for 50 days, or 1-3/5 months. On only 11 days was there no grazing at all for the Station Angus herd of some 20 cow units. The cattle were kept in good flesh at all times."

"Of the dry grazing crops available during this period, hegari supplied 140 cow unit days per acre (in November). Of the green grazing crops, actual full grazing provided was in this order: Crimson clover-ryegrass (volunteer stand) 130; vetch and wild winter peas (1st. planting on established kudzu) 71, manganese bur clover (1st. planting) 70, and late planted oats 30 cow unit days per acre, respectively. All of the green grazing crops, however, will furnish additional grazing in April, and some on into May."

"We believe that the simple and economical methods of developing productive grazing areas on eroded alopes will go farthest in establishing conservation land usage on what is now largely waste land in the Southern Piedmont."

Crimson Clover on Sericea Stubble Fertilized in February - "Crimson clover, oversown last fall on 6 sericea plots that had been mowed for hay, came up to a dense stand on all of the plots. In late March, three bright green plots could be seen on the Class III land slope from a distance of 1/4 mile away."

"These were the ones that received a 3-year application of phosphate and potash fertilizer spread on the surface as a top dressing, last month. The clover on the check plots, unfertilized, was short and grayish green in color, and plainly undernourished.

"Poor success with adapted winter crops, both legume and non-legume, is believed to be largely due to late planting in the fall, and shortage of essential nutrients in the soil especially when the weather permits their rapid growth".

Educational Work with Operations Technicians - T. L. Copley, Raleigh, N. C., - "Meetings were held at 10 different places over the tobacco area of North Carolina and Virginia. These meetings dealt with conservation measures for tobacco land. At each place an indoor meeting of around two hours was held in the morning. Slides were shown and research data presented and discussed in a round table fashion. A field demonstration in the afternoon followed, with the exception of three places, where bad weather interfered. In the field meetings an attempt was made to get each technician familiar with the procedure of laying out tobacco rows by the 'String Method', and the type of land to which it is adapted. Considerable interest was shown at all meetings, and it is believed that we are making progress in getting this very effective conservation practice on the land. Zone Technicians and in some instances a representative from the State Office, assisted with these meetings. The Project Supervisor attended the meetings held at Raeford, Goldsboro, Greensboro, Reidsville, Yadkinville, and Greenville, North Carolina, and at Chatham and South Hill, Virginia. Sidney H. Usry, the Project Engineer, represented research at the meetings held at Windsor and Nashville, North Carolina.

"A group of work unit technicians from Wake County visited the Station for an inside discussion, and also to look around the Station. A field demonstration, similar to the other meetings, was held in the afternoon for this group.

"Some additional meetings have been planned, which will be held in April."

Soil Aggregation and Crop Rotations - D. D. Smith, Columbia, Missouri, - "Stability of aggregation as measured from soil samples secured before the first corn cultivation (middle of June) has increased with increased use of 'grass' in the rotation with the exception of continuous wheat-lespedeza. The rotations had been in operation four years before the first samples were secured. The results are shown in the following table:

| Rotation | Annual Averages | | Average for | |
|---|----------------------|-------------------|----------------------|-------------------------|
| | 6-yr. period 1941-46 | | 2-yr. period 1945-46 | |
| | Soil Loss | Corn yield | Organic matter | Aggregation (stability) |
| | T/A | Bu/A | % | |
| Corn-oats (no treatment) | 8.6 | 26 | 2.6 | 0.48 |
| Corn-oats and sweet clover(1) | 4.2 | 33 | 2.7 | .53 |
| Corn-soybeans-wheat and lespedeza-lespedeza | 5.4 | 29 | 2.8 | .57 |
| Corn-wheat-sweet clover and timothy | 2.9 | 29 | 2.9 | .67 |
| Corn-wheat-grass legume hay 1 yr. | 1.9 | 32 | 2.8 | .70 |
| Corn-wheat-grass legume hay 2 yrs. | 1.6 | 33 | 2.8 | .77 |
| Wheat & lespedeza (grain and hay) | 1.5 | 28 ⁽²⁾ | 2.8 | .82 |

(1) Calculated from sequence study data.

(2) Corn equivalent.

Fals: High Erosion, Low Organic Matter; Low Soil Aggregation, Low Yields - E. A. Carleton, Geneva, New York. - "Laboratory work accomplished during the month is summarized in the accompanying table. The results on degree of aggregation are in relation to an article in FARM RESEARCH, January 1947, by John Lamb entitled, 'High Yields Depend on Erosion Control.' Values for degree of aggregation are tabulated in order of decrease. This places the plots in order of decreasing yield and increasing loss by erosion. Available nutrients were found to be adequate on all plots. Remember, all these plots received an application of 1,000 pounds of 10-10-10 for the corn crop.

Comparison of soil management, soil loss, organic matter, degree of aggregation of silt-clay fraction, and corn yields.

| Plot No. | Management | Soil Loss Tons/ac | Organic Matter Per cent | Degree of Aggregation Per cent | Corn Yield Bu/ac |
|----------|---|----------------------|----------------------------|-----------------------------------|---------------------|
| B-15 | Clover mixture 1935-38 & 1943-45, fallow with straw mulch 1939-42 | 0 | 4.5 | 86.5 | 87 |
| A-10 | Idle; weeds, grass, clover..... | 2 | 4.6 | 85.5 | 82 |
| B-16 | Clover mixture 1935-38 & 1943-45, fallow 1939-42..... | 15 | 4.3 | 84.9 | 71 |
| A-12 | Rotation, corn-oats-clover plus MLPK..... | 4 | 4.2 | 84.1 | 46 |
| A-9 | Meadow, grass and clover plus LPK | 0 | 4.5 | 83.4 | 88 |

(Continued)

| | | | | | |
|------|---|-----|-----|------|----|
| A-11 | Rotation, corn-oats-clover..... | 8 | 3.8 | 79.7 | 38 |
| A-13 | Rotation, corn-oats-clover plus MLP..... | 3 | 4.7 | 79.1 | 64 |
| A-16 | Clover mixture 1935-37, buckwheat residues returned 1938-45..... | 29 | 3.8 | 78.7 | 58 |
| A-1 | Clover mixture 1935-37, buckwheat residues returned 1938-45..... | 15 | 3.3 | 77.1 | 49 |
| A-15 | Clover mixture 1935-37, buckwheat 1938-45..... | 29 | 3.5 | 74.8 | 46 |
| A-14 | Rotation, potatoes-sweet clover + 1200lb. 5-10-5 before potatoes | 13 | 4.1 | 74.7 | 57 |
| A-2 | Clover mixture 1935-37, buckwheat 1938-45..... | 19 | 3.5 | 74.2 | 40 |
| A-3 | Corn continuous 200 pounds 5-10-5, plot 36 feet long..... | 50 | 3.0 | 72.2 | 30 |
| A-4 | Corn continuous 200 pounds 5-10-5, plot 145 feet long..... | 50 | 2.9 | 70.3 | 22 |
| A-6 | Corn continuous..... | 48 | 3.0 | 68.3 | 33 |
| A-5 | Corn continuous 200 pounds 5-10-5 | 34 | 3.1 | 66.8 | 35 |
| A-8 | Fallow, stones in place..... | 74 | 3.0 | 66.8 | 19 |
| A-7 | Corn 1935-38, fallow 1939-45, stones removed..... | 138 | 2.9 | 61.2 | 24 |

Soil Compaction Tests of Geneva Ontario Soil Plots - E. A.

Carleton, Geneva, New York.-"Mr. Free determined the degree of compaction at various moisture levels of samples from the local, Ontario sandy clay loam plots. This test is ordinarily used to determine the suitability of earth for use as core material for dykes and dams. Interesting relationships between compaction, water-holding capacity, soil lost by erosion and organic matter content of the soil from each plot is brought out in the following table.

Soil Compaction at Various Moisture Contents of Ontario Sandy Clay Loam from the Erosion-Control Plots, Geneva, N. Y.

| Plot No. | Treatment | Soil Moisture | Volume weight after compaction | Moisture Equivalent | Soil Loss 1936-1947 | Organic matter 1946 |
|----------|---------------|---------------|--------------------------------|---------------------|---------------------|---------------------|
| | | Per cent | | Per cent | Tons/acre | Per cent |
| 5 | Fallow | 10.5 | 1.64 | 14.4 | 200 | 1.3 |
| | | 13.3 | 1.76 | | | |
| | | 14.7 | 1.81 | | | |
| | | 15.6 | 1.80 | | | |
| 2 | Summer fallow | 9.9 | 1.57 | 14.8 | 77 | 1.7 |
| | | 11.3 | 1.68 | | | |
| | | 15.3 | 1.73 | | | |
| | | 17.0 | 1.76 | | | |
| | | 17.7 | 1.73 | | | |

(Continued)

| | | | | | | |
|---|-----------------------------|------|------|------|----|-----|
| 4 | Soybeans, surface trash | 12.1 | 1.50 | 17.0 | 11 | 2.1 |
| | | 16.2 | 1.66 | | | |
| | | 18.5 | 1.67 | | | |
| | | 20.0 | 1.66 | | | |
| 3 | Buckwheat, surface trash | 12.8 | 1.48 | 16.8 | 9 | 2.4 |
| | | 17.0 | 1.57 | | | |
| | | 19.1 | 1.62 | | | |
| | | 21.3 | 1.63 | | | |
| 1 | Soybeans, fall plowed | 10.9 | 1.48 | 16.6 | 7 | 2.1 |
| | | 14.4 | 1.61 | | | |
| | | 16.8 | 1.69 | | | |
| | | 18.9 | 1.69 | | | |
| 6 | Bluegrass sod | 20.3 | 1.66 | | | |
| | | 11.0 | 1.53 | 16.1 | - | 2.4 |
| | | 14.7 | 1.64 | | | |
| | | 17.6 | 1.71 | | | |
| | | 19.1 | 1.69 | | | |
| | | 19.9 | 1.66 | | | |

Early Winter Protection for Earthworms Benefits Infiltration on Cultivated Land the Following Spring - Henry Hopp, Beltsville, Maryland.-
 "The major limiting factor in maintaining earthworms on row-cropped land in the Beltsville agronomy plots is exposure during the early part of the winter when the earthworms are sensitive to freezing temperatures. By preventing exposure, the earthworms are kept alive and active. When this is done, the soil is granulated with earthworm casts the following spring, whereas without this protection, the soil is compacted. Simple infiltration runs made this month in advance of spring plowing indicate that the capacity of the surface soil to absorb and transmit water is greatly increased by this early-winter protection treatment.

| 1946 Crop | Protected in the Early Winter | | Not Protected in the Early Winter | |
|--------------|----------------------------------|--------------------------------|--------------------------------------|--------------------------------|
| | Earthworms (per Sq.Ft.-7") | Infiltration (In. per Min.) | Earthworms (per Sq.Ft.-7") | Infiltration (In. per Min.) |
| Corn | 22 | .12 | 0 | .03 |
| Corn | 37 | .27 | 0 | .04 |
| Soybeans | 16 | .77 | 7 | .06 |
| Strawberries | 22 | 1.27 | 9 | .01 |
| Strawberries | 62 | .41 | 10 | .00 |

Terrace Channels Clogged by Ice and Snow - Torlief S. Aasheim, Bozeman, Montana.-
 "Considerable water erosion occurred this spring on the contour study at the North Montana Branch Station. Strips cultivated on the contour were not eroded as badly as those cultivated up and down hill, but some foreign drainage made close evaluation difficult. This contour

field is terraced and a terrace directly above the strips used in this study overtopped causing an increased amount of water to flow over certain portions of the strip. In this area, the accumulation of snow and ice in the terrace channel detracts considerably from the effectiveness of terraces in diverting spring runoff. Where snow and ice accumulates deeply enough in the terrace channel, then the terrace overtops and gullies sometimes result."

Effect of Rotation of Cotton, Wheat and Sweet Clover on Soil and Water Loss and on Yield of Cotton Compared with Continuous Cotton - H. A. Daniel, Guthrie, Oklahoma.^{1/}

| Item | 1930-34 | 1935-39 | 1940-44 ^{2/} | 1945-46 | 1930-46 |
|--|---------|---------|-----------------------|---------|---------|
| Reduction in soil loss (percent) | 76.8 | 80.1 | 80.3 | 70.0 | 76.3 |
| Reduction in water loss (percent) | 19.9 | 17.9 | 47.6 | 56.2 | 32.8 |
| Gain or loss in cotton yield ^{3/} (percent) | -10.5 | - 6.3 | 36.9 | 68.2 | 14.0 |

^{1/} This experiment was started on virgin soil in 1929.

^{2/} Beginning in 1940, all plots have received superphosphate at the rate of 250 pounds per acre every third year. The fertilizer was applied under the sweet clover in the rotation.

^{3/} Cotton seed.

"This simple crop rotation on cultivated land has reduced soil losses 76 percent and runoff water 33 percent annually during a 17-year period at the Guthrie station. The native grass sod was destroyed and this experiment started on virgin soil in 1929. The yield of seed cotton in the rotation the first and second 5-year periods was less than that on the continuous area. But during the third period, it was 36.9 percent higher and in 1945 and 1946, it was increased an average of 68.2 percent."

(Editor's note: Rotation cotton showed yield advantage over continuous cotton only after the phosphate treatment was begun in 1940).

Establishment and Growth of Kudzu from Permanent Strips - E. C.

Richardson, Auburn, Alabama.—"For several years kudzu has spread from established stands along terrace ridges into cultivated intervals following the last cultivation of corn. Populations developed in this manner have frequently exceeded 20 thousand crowns per acre; however, a small percentage of these crowns were large enough for planting purposes.

"In 1946 cultivation was discontinued in terrace interval No. 1 and the area allowed to revert to kudzu. The average number of crowns was increased from a total of 19,129 crowns in 1946 to a total of 30,520 crowns per acre in 1947. The large crowns suitable for planting stock increased from 6376 crowns in 1946 to 24,852 crowns per acre in 1947. Results are shown in the table on the following page.

Kudzu Crown Study in Cultivated Area

| Plot No.* | Number of crowns per acre | | | | | |
|---------------|---------------------------|--------|--------|-----------------------|--------|--------|
| | Crowns greater than 1/4" | | | Crowns less than 1/4" | | |
| | 1945 | 1946 | 1947 | 1945 | 1946 | 1947 |
| T1- Subplot 1 | 10,900 | 4,905 | 26,160 | 17,440 | 9,810 | 6,976 |
| T1- Subplot 2 | 10,900 | 7,848 | 23,544 | 21,364 | 15,696 | 4,360 |
| T2- Subplot 1 | 13,952 | 7,848 | 7,848 | 19,620 | 15,696 | 14,824 |
| T2- Subplot 2 | 16,568 | 10,900 | 11,772 | 18,312 | 21,800 | 10,900 |
| T3- Subplot 1 | 13,952 | 9,592 | 7,848 | 10,900 | 19,184 | 11,772 |
| T3- Subplot 2 | 13,952 | 10,890 | 10,900 | 18,748 | 21,780 | 17,440 |

* 1 - Nitrate applied to corn.

2 - No nitrate applied to corn.

T1 - Rotation - 2 year kudzu, 2 year corn.
(Last year in corn 1945)

T2 - Rotation - 2 year kudzu, corn continuous.

T3 - Rotation - 2 year kudzu, 4 year corn.

Effects of Uniform and Mixed Treatments on Peach Tree Yields and Growth - John T. Bregger, Clemson, South Carolina. - "Calculations were made on the between-plot 'border' trees to determine effects of treatments where half the area was planted to one cover crop and the other half to another. These data as they pertain to the vetch and rye winter cover crops are presented in Table I. It will be noted that the half-and-half treatment is higher both in tree size and fruit yield than the midway point between the superior and inferior treatments.

| TABLE I | | |
|----------------------|------------------|----------------------|
| Cover Crop | Yield in Bus. | Trunk Cir. (Ins.) |
| Vetch only | 7.85 | 20.7 |
| Half vetch; half rye | 6.8 | 20.1 |
| Rye only | 5.35 | 16.8 |

(Border trees in peach orchard block planted 1939)

Effects of Certain Cover Crop Species and Management Practices on Peach Tree Size and Growth Rate - "Tree measurements were completed in the Experimental Orchard Annex. These data are presented in the following table and show in addition to the present tree size the per cent gain in trunk circumferences over 1946.

"Cover crops or management practices showing the largest gain are Southern spotted bur clover, Korean lespedeza with spring tillage and crotolaria spectabilis with early summer tillage. It is apparent that any good legume, one that furnishes considerable nitrogen and at the same time allows a certain amount of spring or early summer cultivation, gives desirable results from the standpoint of tree growth and yields.

| Soil Management Practice | Trunk Cir. in Ins. | | |
|--|--------------------|-------|--------|
| | 1946 | 1947 | % Inc. |
| Vetch; summer tillage | 14.5 | 16.1 | 11.0 |
| Crotolaria Spec.; early summer tillage | 13.4 | 15.45 | 15.3 |
| Soybeans-Sudan grass, early summer tillage | 14.0 | 15.4 | 10.0 |
| Clean cultivation | 13.3 | 15.0 | 12.8 |
| So. spotted bur clover | 12.5 | 14.9 | 19.2 |
| Rye winter c.c.; spring mowing | 13.1 | 14.85 | 13.4 |
| Rye winter c.c.; spring tillage | 12.6 | 13.7 | 8.7 |
| Korean lesp.; spring tillage | 12.05 | 14.5 | 20.3 |
| Korean lesp.; no tillage | 12.6 | 14.5 | 15.1 |
| Korean lesp.; fall tillage; rye c.c. | 12.7 | 14.25 | 12.2 |

(Orchard planted 1941.)

Unusual Storms and How Much Did it Snow? - G. R. Free, Marcellus, New York. - "A snow storm occurred during the first week of March at Marcellus that was considered to be in a class with the famed blizzard of March 1888. Another storm near the end of the month was unusual from the standpoint of lowness of barometric pressure and the high winds which caused considerable damage.

"We have become accustomed to the several gages at the station showing considerable variation in catch of both rain and snow, but the records from the storm which occurred during the first week of March at Marcellus are of particular interest in this respect. The six gages on the west slope showed amounts ranging from 1.11 inches to 1.56 inches. A gage on the east slope caught 4.02 inches, while a gage on the hilltop caught only 0.84 inch. One of the gages on the west slope was equipped with a shield, but the catch in it was only 0.03 inch more than in the unshielded gage at the same location. After the storm was over, depth of snow on the upper portion of west slope and on the hilltop was only 1 to 2 inches compared to 12 to 18 inches on the level. Drifted areas along fence rows, by buildings, or in roads had depths of 15 to 20 feet.

"There was considerable runoff during the latter part of the month from melting snow and some rain, but erosion was slight."

DRAINAGE AND WATER CONTROL DIVISION

Hydrology - W. D. Ellison, Washington, D. C.-Two papers were prepared by W. D. Ellison entitled "Soil Erosion Studies--Part I" and "Soil Erosion Studies--Part II (Soil Detachment Hazard by Raindrop Splash)." These will appear in the April and May issues, respectively, of "Agricultural Engineering," Journal of the American Society of Agricultural Engineers.

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"The month of March was noteworthy for its low temperature and small amount of precipitation. Only 0.74 inch of precipitation fell. There was frost in the soil over half of the month. Soon after the soil on meadow lysimeter Y103 (slowly permeable soil) thawed, percolation at the 8-foot depth increased. On March 18 there was 1 inch of frost, on March 19, 1/2-inch and on March 20, only a trace. There was no snow on the ground during this period. Rain and snow prior to this period caused no increase in percolation. Percolation increased from 0.003 inch per day on March 23 to about 0.11 inch per day on March 25. Rain of 0.04 inch on March 23 and 0.18 inch on March 24 may have had something to do with this increase in percolation. The same amount of rainfall under similar frost action, meadow lysimeters Y101 and Y102 (both well drained soils) showed no increase in percolation during this period.

"On March 27 there was 2-1/2 inches of snow, on March 28, 1 inch, and on March 29, no snow. There was no frost in the ground and no rainfall during this period. Percolation increased from March 29 to 31 in all lysimeters. As much as 0.08 inch of water percolated through the soil in these three days in excess of the normal percolation rate.

"On March 21, Mr. Cross of the U. S. Geological Survey, Columbus, Ohio, and Mr. Hiatt of the U. S. Weather Bureau, Chicago, Illinois visited this station to discuss soil moisture measurements. The U.S.G.S. is establishing a runoff measuring station on the East Fork of Little Miami River - a drainage area of about 100 square miles. The Weather Bureau and the U. S. Army are cooperating in a detail study of thunderstorms over this watershed. First order weather stations are to be established every 2 miles. Radar stations are to be set up to map the approach and dimensions of thunderstorms. Airplanes are to fly through and around the storm to record the various phenomena. Soil moisture data are to be gathered on the most important types of soil and land use. Soil Conservation Service operations and research in Ohio may cooperate to the extent of selecting sites for soil moisture determinations and compiling a map of land use."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"Continued cold and wet weather prevailed during March which delayed the usual spring farming operations especially the seeding of oats which would normally be done the last part of the month. The Nebraska Experiment Station at Lincoln, Nebraska, and the substation at North Platte, Nebr., show that over a long period of time that oats seeded on March 20 produce yields of 6 to 22 bushels (depending on the variety) more per acre than those planted on April 20. All varieties show a decrease in yield, depending on the date of planting, after March 30. Because of the smaller expected yield per acre and a shift in acreage from oats to corn the total bushels of oats in this section no doubt will be considerable less in 1947 than anticipated.

"Soil moisture shows a decided crop advantage this year as compared to previous years. Following is a table showing the inches of water in various depths of soil as compared to 1945 and 1946."

| | Depth | Cultivated | Meadow |
|----------------|-------|------------|--------|
| | Foot | Inches | Inches |
| March 20, 1947 | 0-1 | 5.21 | 5.79 |
| | 0-3 | 12.6 | 13.7 |
| | 0-6 | 22.5 | 24.2 |
| March 20, 1946 | 0-1 | 4.19 | 5.26 |
| | 0-3 | 9.80 | 11.4 |
| | 0-6 | 17.8 | 21.0 |
| March 20, 1945 | 0-1 | 4.02 | 5.10 |
| | 0-3 | 11.2 | 13.3 |
| | 0-6 | 19.4 | 22.0 |

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-"An analyses of reductions in runoff losses during the crop period from watersheds in corn under the conservation treatment, 1942-1946, compared to corresponding losses from the corn watersheds under 'prevailing' treatment, has revealed a striking correlation between the reductions in runoff and the increases in corn yield resulting from the conservation treatment.

Table 1.--Average reductions in surface runoff during crop-periods of corn by conservation treatment, and increases in crop yields Purdue-Throckmorton Farm, Lafayette, Ind., 1942-1946

| Year | Reduction in runoff | Yield Increase |
|---------|---------------------|----------------|
| | Inches | Bu./Acre |
| 1942 | 2.74 | 25 |
| 1943 | 1.67 | 33 |
| 1944 | 0.02 | 22 |
| 1945 | 4.22 | 51 |
| 1946 | 0.48 | 27 |
| Average | 1.83 | 32 |

"The 1942 yield increase by the conservation treatment is considered to have been limited by the same rate of seeding with both treatments. In subsequent years, the plant population of conservation treated corn has been increased to maintain similar, efficient ear sizes under both treatments. A graph of the above data shows the points for years 1943-46 to lie practically on the line:

$$Y = 21.5 + 7X, \text{ when}$$

Y = increase in corn yields, and

X = reduction in crop-period runoff.

"A manuscript was prepared covering the above information, for early mimeograph release. Several other analyses have been started for study of crop utilization of water conserved by reduced runoff."

Hydrologic Studies - R. G. White, East Lansing, Michigan. - "The outstanding storm of the season occurred on March 24-25 when 0.46 inch of precipitation fell at the cultivated watersheds. This storm started as rainfall on the afternoon of March 24 but turned to snow in the evening. Accompanying high winds caused severe drifting which completely paralyzed central Michigan for over two days.

"Early in the month, a new set of Bouyoucos soil-moisture blocks were received to replace the blocks now in use at the cultivated watersheds. Uniformity tests have been run on the blocks, and as soon as field conditions permit taking soil samples, the blocks will be embedded in soil and calibrated. It is planned that the blocks be installed in the field during the early fall months."

Hydrologic Studies - R. W. Baird, Waco, Texas. - "During the month of March there were 8 days with freezing temperature. The last day with below freezing temperature was March 16. Average temperature was considerably below normal. Total rainfall for the month was 4.34 inches at Station 69. There were three storms on the 7th, 12th, and 18th, that caused appreciable amounts of runoff. The amounts and maximum rates of runoff at some of the stations were as follows:

| Watershed : | March 7 | | March 12 | | March 18 | |
|-------------|------------------------------|---------|-------------------------------|---------|-------------------------------|---------|
| No. | Total | Maximum | Total | Maximum | Total | Maximum |
| | runoff | rate | runoff | rate | runoff | rate |
| | Inches | Inches | Inches | Inches | Inches | Inches |
| | per hour: | | per hour: | | per hour: | |
| Y- | 0.3052 + .0194 March 8 | 0.0537 | 0.3970 + .0291 March 13 | 0.208 | .9858 + .0740 March 19 | 0.319 |
| Y-2 | .2564 + .0158 March 8 | .0428 | .3524 + .0248 March 13 | .197 | 1.0201 + .0749 March 19 | .257 |
| W-1 | .2416 + .0087 March 8 | .0779 | .2588 + .0111 March 13 | .169 | .8261 + .0259 March 19 | .304 |
| W-2 | .3640 + .0189 March 8 | .105 | .3502 + .0307 March 13 | .214 | .9727 + .0500 March 19 | .328 |

"The rainfall for these three storms was unusually uniform, the weighted rainfall for each of the areas was as follows:

| Weighted rainfall for | March 7 | | March 12 | | March 18 | |
|-----------------------|---------|--|----------|--|----------|--|
| area | | | | | | |
| Y | 1.350 | | 1.011 | | 1.703 | |
| Y-2 | 1.355 | | .993 | | 1.706 | |
| Y-4 | 1.358 | | .975 | | 1.713 | |
| Y-10 | 1.369 | | .996 | | 1.724 | |
| W-1 | 1.437 | | 1.000 | | 1.741 | |
| W-2 | 1.430 | | .993 | | 1.738 | |
| W-6 | 1.450 | | 1.040 | | 1.750 | |
| W-10 | 1.400 | | .920 | | 1.720 | |

"Results from these three storms do not follow well the pattern for storms since conservation practices had been established on areas Y and Y-2. The runoff rate from areas Y and Y-2 was considerably higher than we should have anticipated. No very definite trend has been noticeable on the amounts of runoffs from previous storms. Conservation practices have not appreciably affected the amount of runoff as judged by these three storms.

"A schedule of treating soil for control of wireworms prior to the planting of corn has been developed with Mr. Glick, who is with the Bureau of Entomology. The treatments being used are an application of benzine hexachloride, using either commercial dusting sulfur or pyrophyllite as the carrier. One of these treatments has been used on about two-thirds of the corn planted this spring. Mr. Glick expects to start observations on the effectiveness of the control as soon as the corn comes up."

Runoff Studies - V. D. Young, Fayetteville, Arkansas.-During the month Mr. Young prepared a paper entitled "Rainfall-Runoff Relationships from Small Watersheds" for presentation before a meeting of the Southwest Section of the American Society of Agricultural Engineers held at Texarkana, Ark.-Texas on April 4.

Runoff Studies - T. W. Edminster, Blacksburg, Virginia.-"On March 5 the Project Supervisor visited the field work in drainage at Suffolk, Virginia. Special emphasis was placed on observing the 'quick-sand' conditions that are being encountered over extended areas near Suffolk. The extent of these areas and the difficulty that they are causing when tile trenching machinery is used indicated a need for some special studies to be made to determine (1) the stability of tiles laid in this 'quick-sand' layer, (2) the minimum grade at which a tile line may be laid in the 'quick-sand' without danger of clogging and (3) modifications of methods and procedure of laying, papering, blinding, and back-filling tile lines under such 'quick-sand' conditions. It was pointed out by Mr. C. M. Jones and other district personnel that in order to study these items it would be necessary to complete the installation of a test system on or about April 15 otherwise installation would have to be delayed until the following year. Consequently a conference was held in Washington on March 10 where a procedure of study was outlined and discussed with Mr. L. A. Jones and Dr. Nichols and clearance was obtained to proceed with the installation. Following this initial clearance, Mr. Walker and Mr. Turner have completed preliminary soil and topographical surveys necessary on the proposed site. Other cooperative measures have been worked out by the district personnel.

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-"Mr. Anderson spent the first 3 days of the month with Mr. Edgington, Office Engineer, Region V Engineering Division, making tests of a drop structure to be used on Case-Wheeler projects. Preliminary tests had shown that scour at the inlet would undermine the inlet box and that a large hole would be scoured at the outlet. The outlet scour does not endanger the structure, but the eroded material was deposited in the irrigation ditch, completely filling it. A large amount of maintenance would be required during the irrigation season, and it would probably be

necessary to stop irrigation and clean the ditch no matter how badly the crops under the ditch needed water. A simple and economical solution that prevented scour at the inlet was found when the box-inlet floor was extended upstream beyond the sidewalls. Mr. Edgington decided that a standard pipe outlet would be required at the pipe exit. The standard outlet was modified slightly on the basis of results obtained from other studies at the St. Anthony Falls Hydraulic Laboratory. These modifications included an end sill and flaring wingwalls cut on a 1:1 top slope. The outlet worked well, but whirls within the outlet structure showed it to be larger than necessary. The outlet was first reduced in length from 5 feet to 4 feet and subsequently reduced in width from 4 feet to 3 feet. It appears that a reduction in length to 3 feet for a 12-inch pipe operating under a 2-foot head is feasible. This reduction in size was accomplished with no increase in the scour over that obtained with the larger outlet, and there was considerable improvement in the hydraulic performance. Mr. Edgington estimated that the saving per structure in concrete cost would amount to about \$25. For the approximately 600 structures to be installed on Case-Wheeler projects in Region V the total saving is in the order of \$15,000. In addition, the tests will permit a redesign of the Region V standard pipe outlet and, based on Mr. Edgington's estimate that 1,000 outlets are built each year in Region V, the annual saving will be about \$25,000. At present it appears that additional work to develop general design laws will permit further economies and improved performance.

"Mr. Anderson spent the remainder of the month in setting up and testing the 2-1/4-inch diameter pipe model of the drop inlet spillway having a pipe length of 100 diameters. Twenty-two tests were made of this model with the pipe set on a 2-1/2 percent slope. This slope is flatter than the friction grade line. The results obtained from these tests were being analyzed at the end of the month.

"Mr. Donnelly continued his exploratory submergence tests on the box inlet drop spillway. It was discovered that the effect of submergence on the head over the spillway crest was a function of the width of the stilling basin at the outlet end rather than a function of the rate of flare of the outlet sidewall as previously assumed. The preliminary results indicate a significant reduction in the effect of submergence on the head over the spillway as the width of the outlet is increased. However, outlet widths greater than 1-1/2 times the spillway width do not provide additional benefits in the reduction of the submergence effect on the head over the spillway. The tests to date further indicate that the greatest relative effect of submergence is felt at that discharge where the free flow-control section changes from the crest of the box-inlet drop spillway to the headwall opening. Preliminary studies indicate that it may be possible to reduce the number of tests required to evaluate the submergence effect if some of these findings are utilized.

There will be a small sacrifice in the accuracy of the results although it is expected that the precision of the results will be well within practical limits even though the short cuts are used. Moreover, the short cuts may make it possible to reduce greatly the number of tables and charts required for design purposes although it appears that more skill will be required in applying the results and that the design work will be slightly increased thereby. At this time it is felt that the saving in time required to run the tests will make the short cuts economical.

"The paper entitled 'Development and Hydraulic Design, Saint Anthony Falls Stilling Basin' by Fred W. Blaisdell was published in Proceedings of the American Society of Civil Engineers for February, 1947, page 123. This paper describes the tests and their results which led to the development of the SAF stilling basin. The results are presented in more detail than they were in the bulletin entitled 'The SAF Stilling Basin'."

Drainage - C. E. Ramser, Washington, D. C.-A short report entitled "Vegetation in Drainage Ditches Causes Flooding" by C. E. Ramser, which was originally published as a 1926 Yearbook article and revised and expanded in 1947, was released as SCS-TP-62 in March.

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"Rainfall in this area is low varying from 0.69 of an inch at Peters, Fla. to 1.50 inches on West Mowry. As a result of this low rainfall water tables for the area dropped from 0.63 to 0.93 of a foot, the greatest drop being on the south end of the Redland Road profile. The greatest losses occurred toward the marl lands and inland toward the glades. Should low rainfall and no recharge occur this next period will be critical.

"In the study on nitrate losses, nitrate is applied as Uraman in the overhead irrigation equipment at the following amounts: $1/4$, $1/2$, $3/4$, and 1 pound per tree. From the studies so far indications are that we had uniform disbursement of our fertilizing materials. Studies are being carried on to determine the losses due to rainfall. This study will be carried out for a sufficient period to determine if any of the losses are due to leaching of nitrates.

"During this period of low rainfall the mulched plots, shavings, pine straw, and grass are showing up much better than natural cover on the check plot areas with the pine-straw and grass mulch material somewhat better than the shavings-mulched area.

"In the Miami area results of our analyses indicate that where structures have been placed in the canals the chloride content is not rising very rapidly. But in the Tamiami area where no structure is in operation the

chloride content of the soils increased quite a bit during the last period. In the Homestead area, along the Goulds, Military, and North canals, the concentration of chlorides in the surface soils has approximately doubled that of last month."

Drainage Studies - James Turnbull, Lake Alfred, Florida.--"During March the discharge tests on various sizes of drilled holes in portable irrigation pipe were completed and the data are being worked up. The tests were run on 14 gage 6-inch pipe. Additional tests on lighter gage pipe and on aluminum pipe are contemplated.

"In order to obtain more complete information on the effects of irrigation, arrangements have been made for specialists of the Citrus Experiment Station to conduct studies of the fruit from the experimental plots near Haines City.

"Internal differences in percent acids and solids, quantity of juice, granulation, and rind thickness will be studied as well as the keeping quality of the fruit under controlled storage conditions.

"Interception studies, which were discontinued sometime ago because a number of cans developed leaks, have been renewed with new cans being installed. Difficulty in obtaining sufficient cans has made it necessary to reduce the number of trees included in the study.

"Heavy rains in February caused a rise in the elevation of the water table and more rain in March has continued the upward trend."

Drainage Studies - I. L. Saveson, Baton Rouge, Louisiana.--"The writer presented a paper 'Drainage Research for Sugar Cane Land' on March 5 at the Contact Committee meeting of the American Sugar Cane League. The paper was illustrated with slides and a short movie of the work."

Drainage Studies - J. R. Carreker, Athens, Georgia.--"Detail plans for the studies to be conducted this summer were completed so far as was practical. These studies are to include:

I. Pasture - Irrigated vs. unirrigated

1. Determination of vegetative production of pasture plants
2. Gains in weight of cattle
3. Amount of supplemental feed required to maintain adequate gains

II. Corn - Irrigated vs. unirrigated

1. Tennessee 10 hybrid
2. Three spacings in the row: 12", 18", and 24"; with all rows 42" apart
3. Four fertilizer rates to provide 32, 64, 96, and 128 pounds per acre of nitrogen

III. Vegetables - Irrigated vs. unirrigated

1. Vegetables will include tomatoes, okra, and pole beans
2. A split plot arrangement will be superimposed on these vegetables to study the effect of 3 different fumigants for nematode control under irrigated vs. unirrigated conditions. This portion of the study is in cooperation with the College of Agriculture Department of Plant Pathology."

Sedimentation Studies - L. C. Gottschalk, Washington, D. C.-

"A detailed sedimentation resurvey was made of Spartanburg Municipal Reservoir, Spartanburg, S. C., during the period March 4-15. A sedimentation survey made of this reservoir in 1934, after it had been in operation for a period of 8.2 years, showed a total loss of storage capacity of 17.15 percent due to silting. The average rate of sediment production from 1922-1934 amounted to 56.5 acre-feet per year from the 91.0 square-mile watershed above the reservoir. Computation of data from the survey made in March is now under way. There has been a considerable change in land use in the watershed since the first sedimentation survey was made. It is anticipated that the effects of land-use changes will show up in the results and can be correlated with the rate of silting of this reservoir.

"C. B. Brown prepared a paper entitled 'The Effects of Land Use on Sedimentation in Lake Decatur'. This paper will be presented at the Annual Meeting of the American Geophysical Union April 29, 1947. Sedimentation surveys showed an increase of 20 percent in the rate of silting of Lake Decatur, Decatur, Ill., from 1936-1946, as compared with the period 1922-1936. During the latter period the percentage of land used for erosion-producing, intertilled crops in Piatt County, which is typical of the area, was increased from 39.0 percent in 1924 to 64.6 percent in 1943. The effect of changes in land use on the rate of silting of the reservoir and a recommended soil-conservation and watershed-treatment program are discussed. It is estimated that this program would reduce sedimentation to 38 percent of the average rate prevailing during the 10-year period, 1936-1946."

Sediment Studies - Vito A. Vanoni, Cooperative Laboratory, California Institute of Technology, Pasadena, California.-"In connection with experiments carried out in the 33-inch flume with coarse materials and low velocities, it became necessary to alter the standard sampling technique developed for finer sediments. It is believed that this will help explain some of the erratic and inconsistent results obtained previously.

"Good progress was made on a series of experiments on bank revetment. These experiments are carried out in a model basin 10 feet wide which has a sand bed in it about 40 feet long. A trapezoidal-shaped sand channel 30 inches wide is molded in this bed and flows are run through it with different types of revetment. The laboratory experiments have been designed to vary the resistance of a fence revetment and the roughness of the bank to flow. Preliminary results of experiments indicate that by increasing the resistance of the fence or by decreasing the size of the opening, the rate of erosion of the bank is decreased. A second set of experiments in which both the resistance of fence and the roughness of the bank were varied shows that the roughened bank offers considerable protection. This would indicate that the effect of vegetation is important and confirms field experience."

IRRIGATION DIVISION

Oregon Irrigation Projects - E. C. Gwillim, Corvallis, Ore.-

"In field studies in Oregon I found that in two irrigation districts in Lane County only 10 percent of the irrigable land is being irrigated. This raises a question as to what is the basic reason for this condition. The cost of water is low and the water supply is adequate. I have included the investigation of this problem in the proposed project for the Willamette Valley."

Hawaii Water-Law Study - Wells A. Hutchins, Berkeley, Calif.-"The Legislature of Hawaii convened February 19. The Governor's message to the Legislature recommended careful consideration of a ground-water control measure to be submitted, similar to the one introduced at the 1945 session. The measure was introduced in both houses on March 21.

"Time devoted to this project consisted of review of basic data and preparation of suggestions for clarifying some of the provisions of the proposed measure.

"A letter from Frederick Ohrt, Manager and Chief Engineer of the Honolulu Board of Water Supply, indicated that the necessity for my going to Honolulu to advise with the Legislature was still indefinite."

Irrigation Efficiency - Dean C. Muckel, Upper Santa Ana, reports:-"Irrigation efficiency studies were made on an irrigated pasture and also soil samples taken for determining consumptive use. During March there were two irrigations of about 3 acre-inches each given the plot. Samples were taken to a depth of 6 feet but the data shows that the plants used water from the top 3 feet only. A 20-acre alfalfa field was selected for irrigation efficiency and consumptive use studies. This field, as with practically all other alfalfa fields in the area, is irrigated with portable surface pipe."

Teaching Irrigation by Radio - Ivan D. Wood, Denver, Colo.-"At the request of the Extension Service in Nebraska I made a tour of the pump irrigation in Hamilton County, near Aurora, Nebr. I was accompanied on the tour by representative of radio station WOW, who made transcriptions of our conversations with farmers for broadcasts over the station during the succeeding weeks. In the evening I talked to a group of 85 farmers or members of the Hamilton County Irrigators Assn. Transcriptions of the talks at this meeting were made by radio station WOW of Omaha and KMMJ of Grand Island."

Snow Surveys - Willis C. Barrett, Logan, Utah.-The first model of snow-mobile has been completed and operation tests made are very encouraging. "Some new features of the first snowmobile give particularly satisfactory results; however, the materials in the tracks as well as the workmanship have not met the stresses and conditions imposed on them." If practicable, further tests will be made this season.

Wayne D. Criddle, Boise, Idaho.-"In general, the streamflow forecasting in northern Idaho, western Montana, and Washington for the past year appears to be quite accurate. The Columbia River runoff at The Dalles, Ore., was forecast within 6-1/2 percent for approximately 106 million acre-feet."

Dean K. Fuhrman, Logan, Utah.-"In spite of the fact that precipitation over most of Utah during February and March was somewhat deficient, the annual snow survey at the end of March showed that a normal water supply is available in most areas of the state for the coming season. Snow cover-runoff correlations established during the past months have made possible the addition of detailed forecast of water supply on six streams not previously listed in the annual forecast bulletin. One of these, American Fork River, was made possible by the release of 20 years of streamflow record by the Utah Power and Light Company which has maintained the record in the past."

C. E. Houston, Reno, Nevada.-"Snow surveys and related data for Arizona indicate that an acute water shortage in both runoff and storage are in store for Arizona during the coming irrigation season."

"Nevada storage is good, but runoff for the coming season will be from 50 to 70 percent of normal."

Homer J. Stockwell, Fort Collins, Colo.-"The March 1 snow reports were issued about March 11 for the three basins covered by this office. The snow cover is generally above normal except for northern New Mexico and Arizona. In some areas in Montana the snow cover is unusually high with snow melt in March combined with ice jams resulting in floods. Snow at elevations down to 7,000 feet has been usually good and the present indications are that the summer runoff in the Colorado and Missouri-Arkansas River basins will be well above normal."

R. A. Work, Medford, Oregon.-"Arrangements have been completed to furnish west-wide water forecast to Reclamation ERA. Arrangements completed to furnish west-wide forecast to WESTERN CONSTRUCTION NEWS and ELECTRICAL WEST. Tentative arrangements made to furnish to NATIONAL RECLAMATION ASSOCIATION reprints of the WCN article."

Evaporation from Water Surfaces - Arthur A. Young, Pomona, Calif.-Arrangements have been made for printing by the California State Engineers Office of Mr. Young's 370-page manuscript on "Evaporation from water Surfaces in California."

Water Forecasting, Colorado River - R. L. Parshall, Fort Collins, Colo.-"Preparations are well advanced in connection with the detailed arrangements covering the Colorado River Water Forecast Committee Meeting in Los Angeles April 16. The program as now arranged is ready for mimeographing and will be sent out about April 5th.

"Considerable time has been given to the matter of developing 3 or 4 different methods of forecasting the flow of the Colorado River at Bright Angel. Major Stockwell has also developed one or more methods, and it is the plan to discuss these matters at the Los Angeles meeting."

Seepage Losses - Carl Rohwer, Fort Collins, Colo.-"Revision of report on Seepage Losses from Irrigation Channels has been completed. Manuscript is now being typed. This report is a compilation of the results of seepage observations made in California and Colorado by various methods on lined and unlined canals and laterals. It also includes a discussion of the factors that influence seepage and of the hydraulic principles involved."

Imperial Valley Drainage Investigations - V. S. Aronovici, Pomona, Calif.-"The preliminary draft of the 1946 Imperial Valley Drainage Investigations Progress Report was completed and submitted to the Drainage Committee for approval."

Deep Well Project - W. W. Donnan, Imperial, Calif.-"Two deep wells have been drilled by the Imperial Irrigation District in a vertical drainage experimental project. The Division of Irrigation is cooperating to the extent of making detailed water-table observations during pumping to record the effectiveness of this experiment. About 100 piezometer wells have been installed at the two sites. A pump has been installed on the West Side well and pumping is now in progress from shallow depths. An estimated 600 g.p.m. is being developed from a 24-foot level at this writing and some effect is apparent out 2,000 feet from the well."

Measuring Tile Effluent - W. W. Donnan, Imperial, Calif.-"A device has been developed to measure tile effluent utilizing a sensitive water-stage recorder and a paddle float in the mouth of the tile outlet. After preliminary calibration the device can record effluent fluctuation through irrigation cycles with a minimum of man-hour maintenance."

Drainage in Utah - J. Howard Maughan, Logan, Utah. - "The problem of drainage in Utah was largely brought about by irrigation. One need in a drainage program is to include all the land that contributes, through irrigation or otherwise, to the drainage problem. In the Lewiston, Utah area, Cache County, four independent drainage districts were set up during the 1920's to drain about 6,000 acres in a contiguous unit area totaling more than 12,000 acres, extending across the Utah-Idaho state boundary. Four districts are in Utah and one small unit in Idaho. When the first district was organized, the engineers advised that this entire area should be incorporated into a drainage enterprise and the whole problem be dealt with as an integrated unit. When the other districts came on, the records show, this advice was reiterated. However, in each case, the problems of consolidation were so great and the needs for immediate local action so pressing that the units proceeded independently.

"Experience has shown the advice of the engineers to be right. The physical laws relating to drainage have no regard for district boundaries or for County or State boundaries, and drainage leaders in this area have all come to recognize the merits of encompassing the whole drainage problem in a single program. They are now advocating a single irrigation and drainage district to take the place of seven irrigation and five drainage enterprises. But the inertia of established practice and organization is very great; many of the people are not willing to change and it seems probable that united action will be more difficult to obtain now than in the beginning."

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